

# ACTIVITY #1 -- Sketch a superhero engineer.

Don't sketch this one...



... create your own.



Based on manufacturers' data.

[Source: Vimont Toyota Laval - YouTube](#)



# Research & Development



Source: <https://www.toyota.com/usa/operations/>

# Engineering & Manufacturing

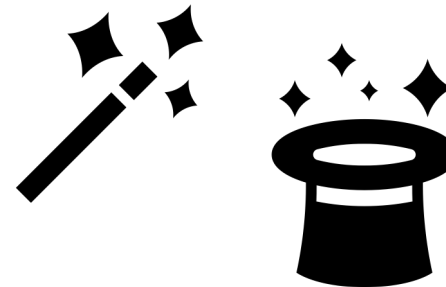
Carnegie  
Mellon  
University

# Customer Enchantment through Design Thinking

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Brad Eiben

Executive Director, MS in Product Management







Design a widget or app.



Solve your customer's problems.



<https://www.iconspng.com/image/46263/the-thinker-grayscale>

- Hands-On
- Customer-Focused
- Problem First





[A New Cosmic Tension: The Universe Might Be Too Thin | Quanta Magazine](#)

- Software
- Hardware
- Services






# PURPOSE

To learn a design framework and fundamental principles, with emphasis on “getting dirty,” so that we may deliver value to customers by solving their problems.



# AGENDA

- About Me
  - About You
  - Double Diamond
  - Discover
  - Define
  - Activity #2
  - Design
  - Deliver
  - Q&A
- Activity #3  
Time Permitting
- 

A decorative plaid pattern with red, green, and yellow lines on a dark blue background, located on the left side of the slide.

# HOUSEKEEPING

Let's interact.

This is a broad overview.



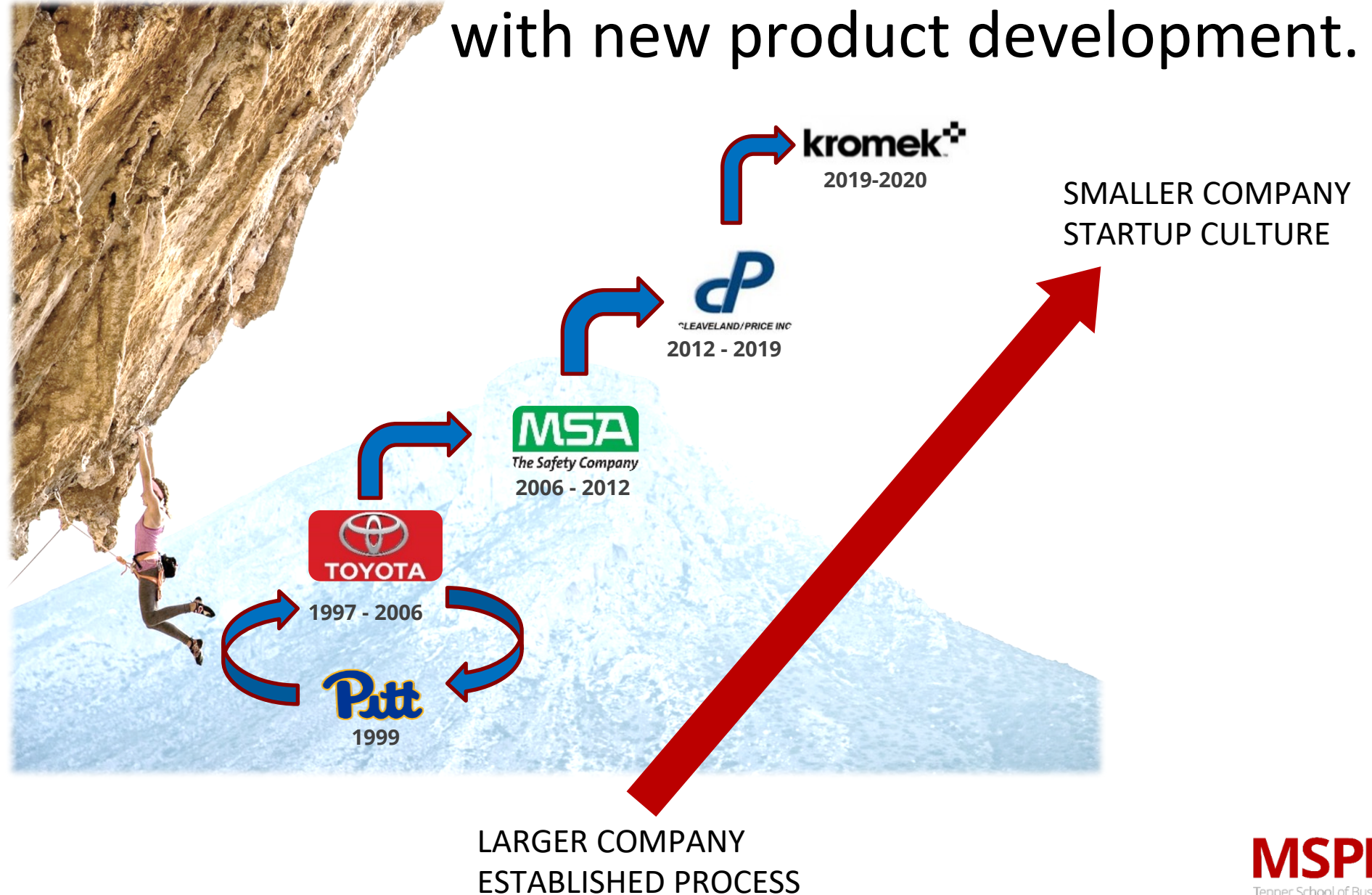
# ABOUT ME



Foundation at Toyota in lean culture.

# ABOUT ME

More than 2 decades involved  
with new product development.



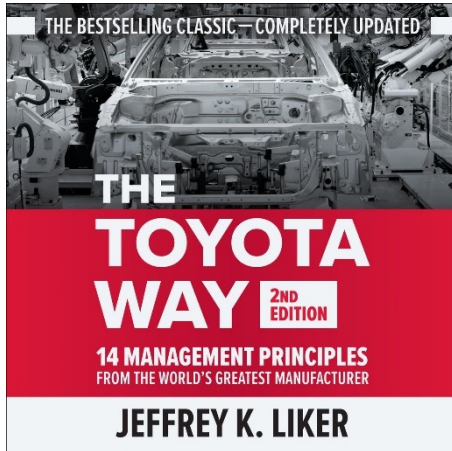


# ABOUT ME



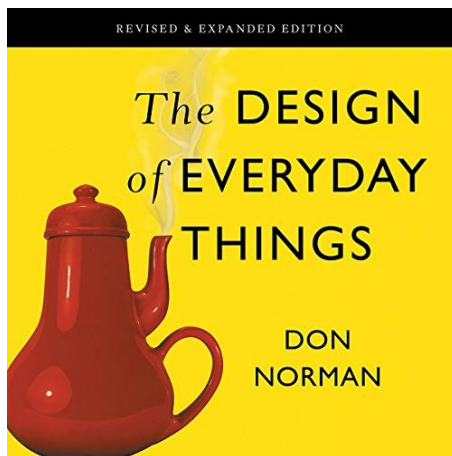
Taught HCI for Product Managers and advised on projects for two years.

# ABOUT ME



Lean Thinking

Design Thinking



Parallel problem-solving processes.



[Dna Definition & Meaning | Dictionary.com](#)

# ABOUT ME



# MSPM

Tepper School of Business+  
School of Computer Science

Executive Director, MS in Product Management



# MS in Product Management



Source: twitter.com @freakonomics

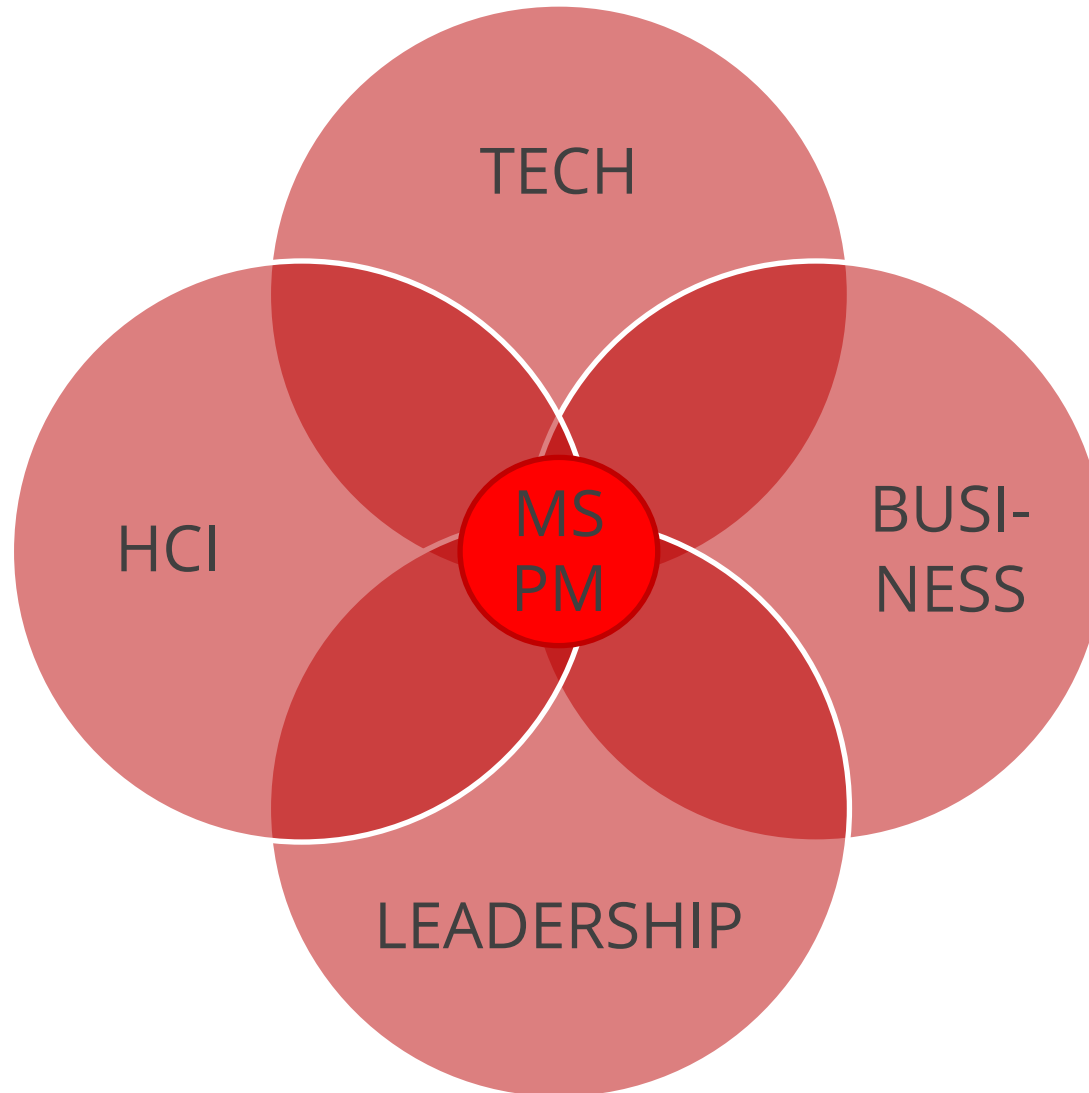


+

**Carnegie  
Mellon  
University**

School of  
Computer  
Science

# MS in Product Management



- ~7 years average exp.
- Variety of backgrounds:
  - ½ Computer Science
  - ¼ Other Engineering
  - ¼ Business and Misc.
- Many have grad degrees
- “I’m ready to take the leap.”

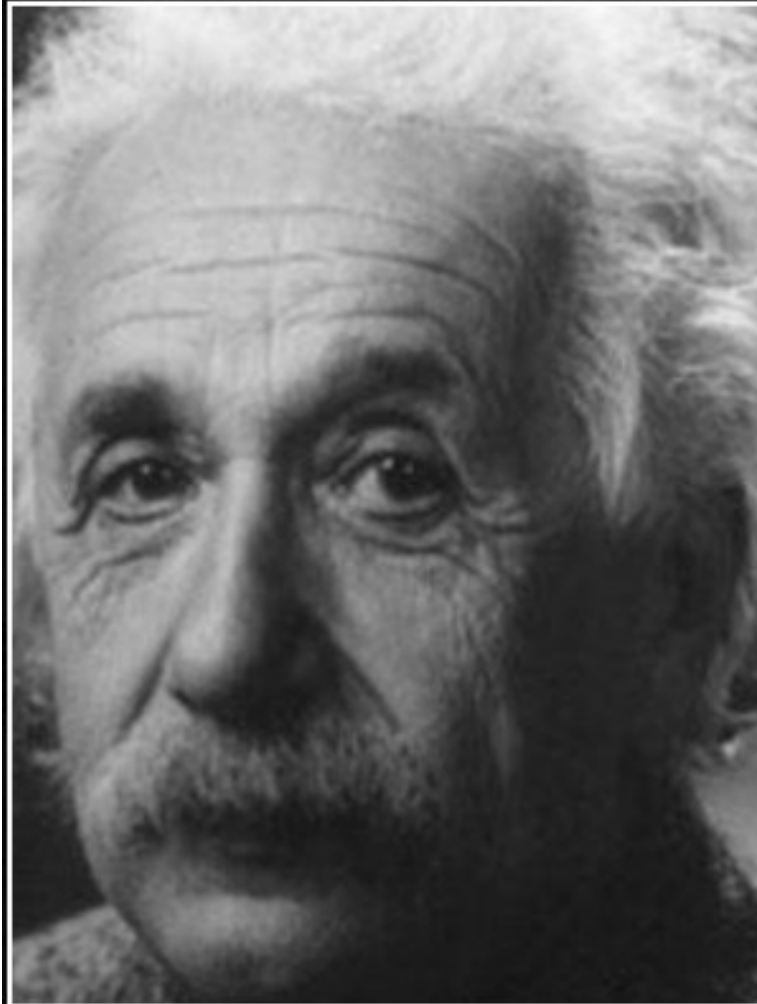
# ABOUT YOU







# DOUBLE DIAMOND



If I had an hour to solve a problem  
I'd spend 55 minutes thinking about  
the problem and 5 minutes thinking  
about solutions.

— *Albert Einstein* —

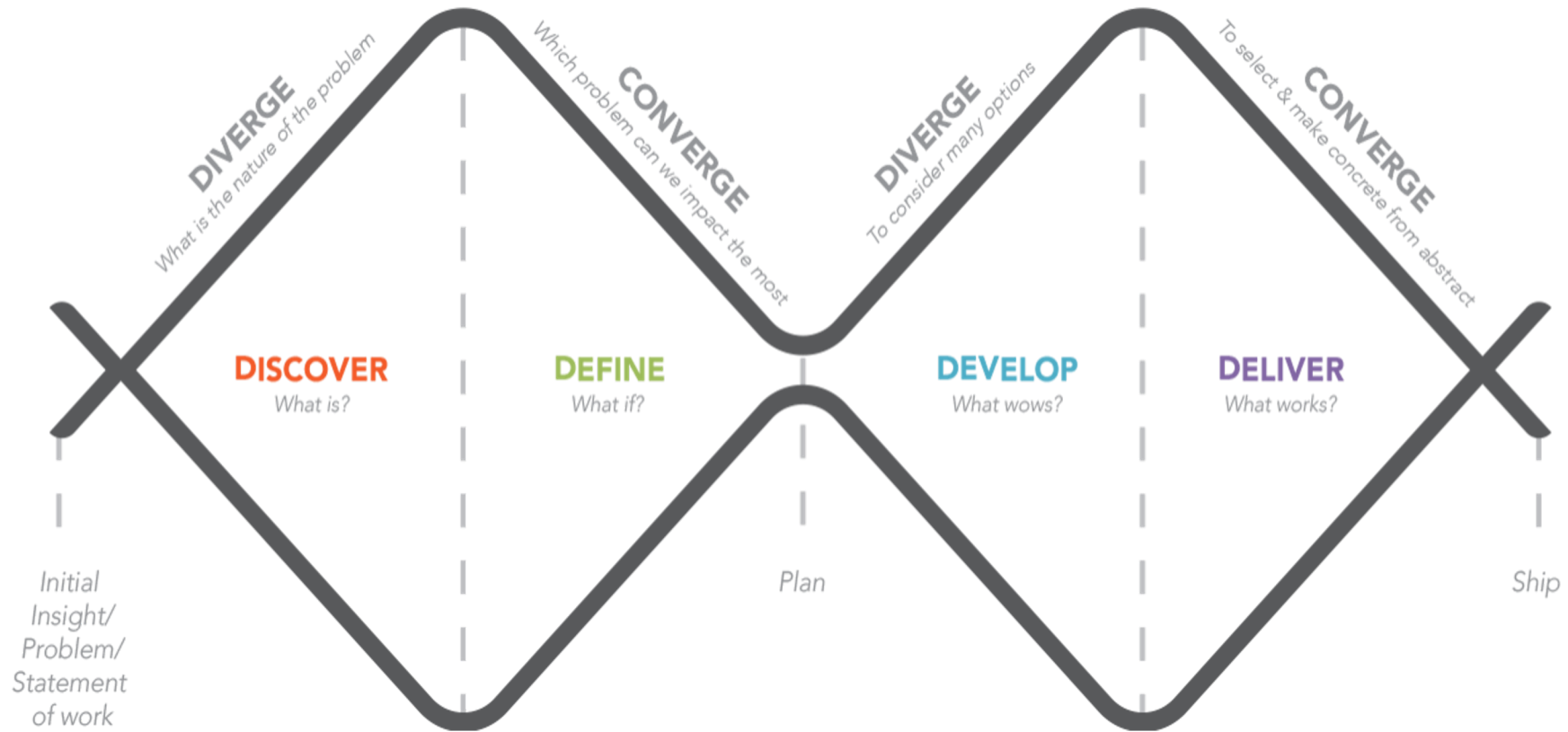
AZ QUOTES



# DOUBLE DIAMOND

Problem Space

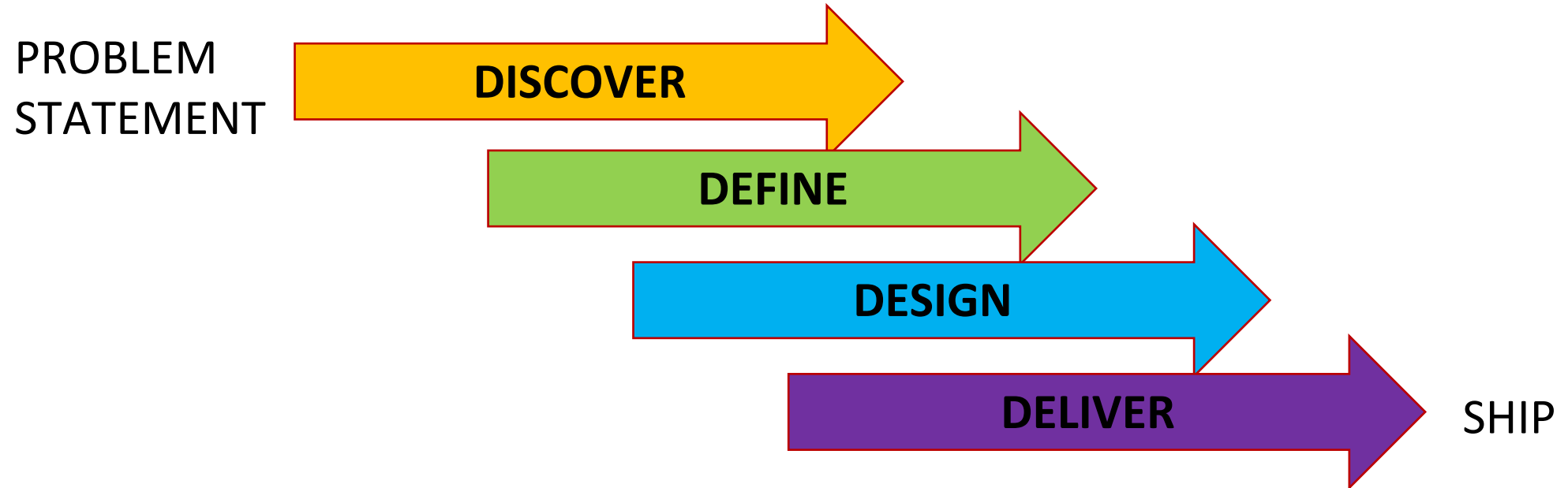
Solution Space



Iterate Throughout

Source: <https://www.nicepng.com/maxp/u2t4r5q8t4a9e6u2/>

# DOUBLE DIAMOND – HARDWARE







# DISCOVER

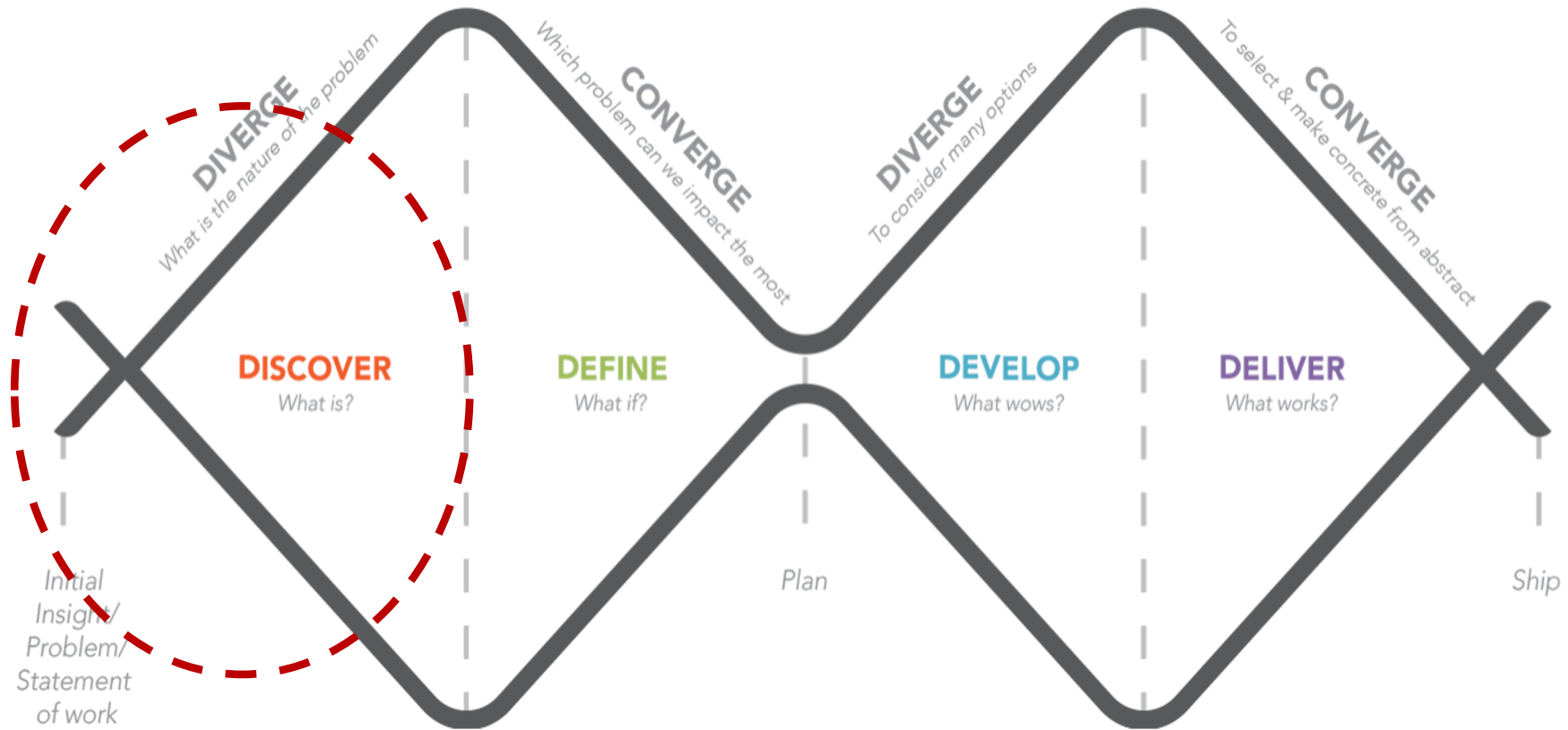


Go see, ask why, show respect.

— *Fujio Cho* —

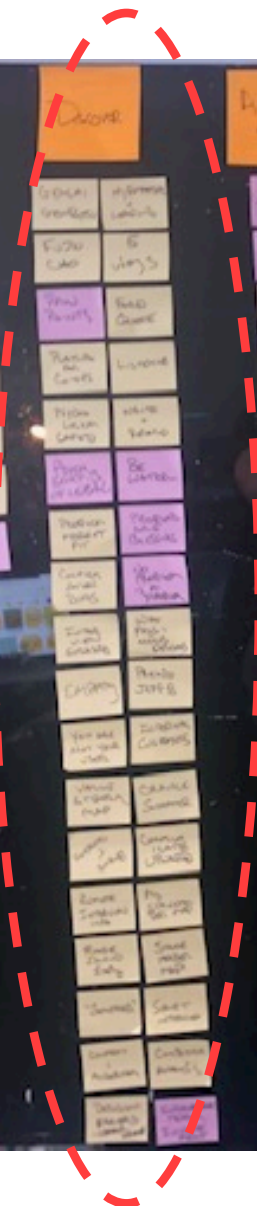
AZ QUOTES

# DISCOVER



Source: <https://www.nicepng.com/maxp/u2t4r5q8t4a9e6u2/>





# DISCOVER

Goals: collect data, empathize, observe

Mindset: humble, inquisitive, hands-on

Tactics:

- Interviews & Surveys
- Journey Mapping
- Competitive Analysis
- Stakeholder Mapping

A decorative plaid pattern with intersecting red, green, and yellow lines on a dark blue background, located on the left side of the slide.

# DISCOVER – INTERVIEWS & SURVEYS

When to use each?



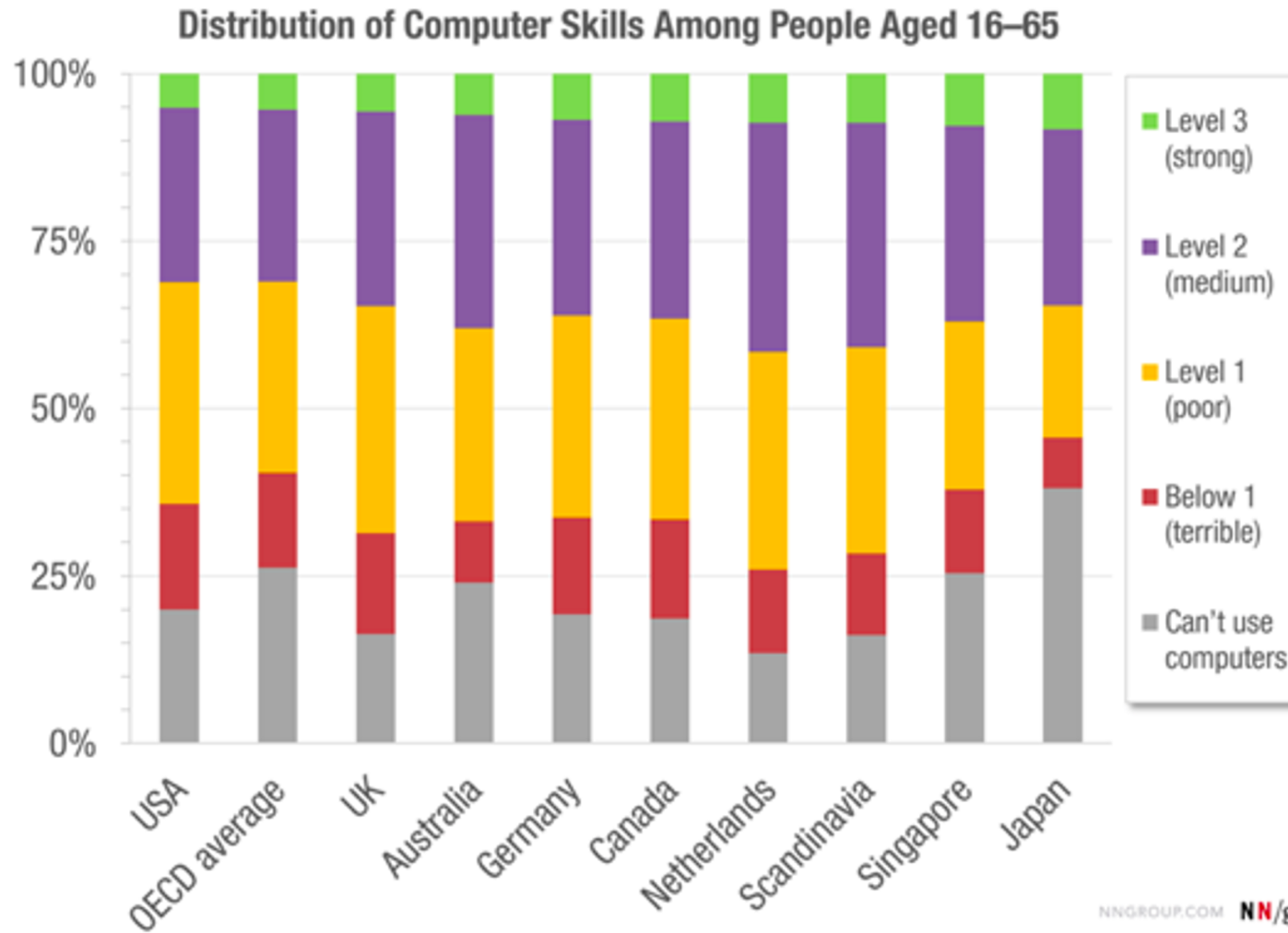


# DISCOVER – INTERVIEWS & SURVEYS

## Interview Considerations:

- Anticipate Goals
- Plan, Script, Record
- Competitive Analysis
- Types of Interviewees
- Mood and Emotion
- Genchi Genbutsu
- 5 Whys
- Journey Mapping

# DISCOVER – INTERVIEWEES



The user is not like me!

# DISCOVER – GENCHI GENBUTSU



<https://dlccs.com/legal-document-management-systems/>



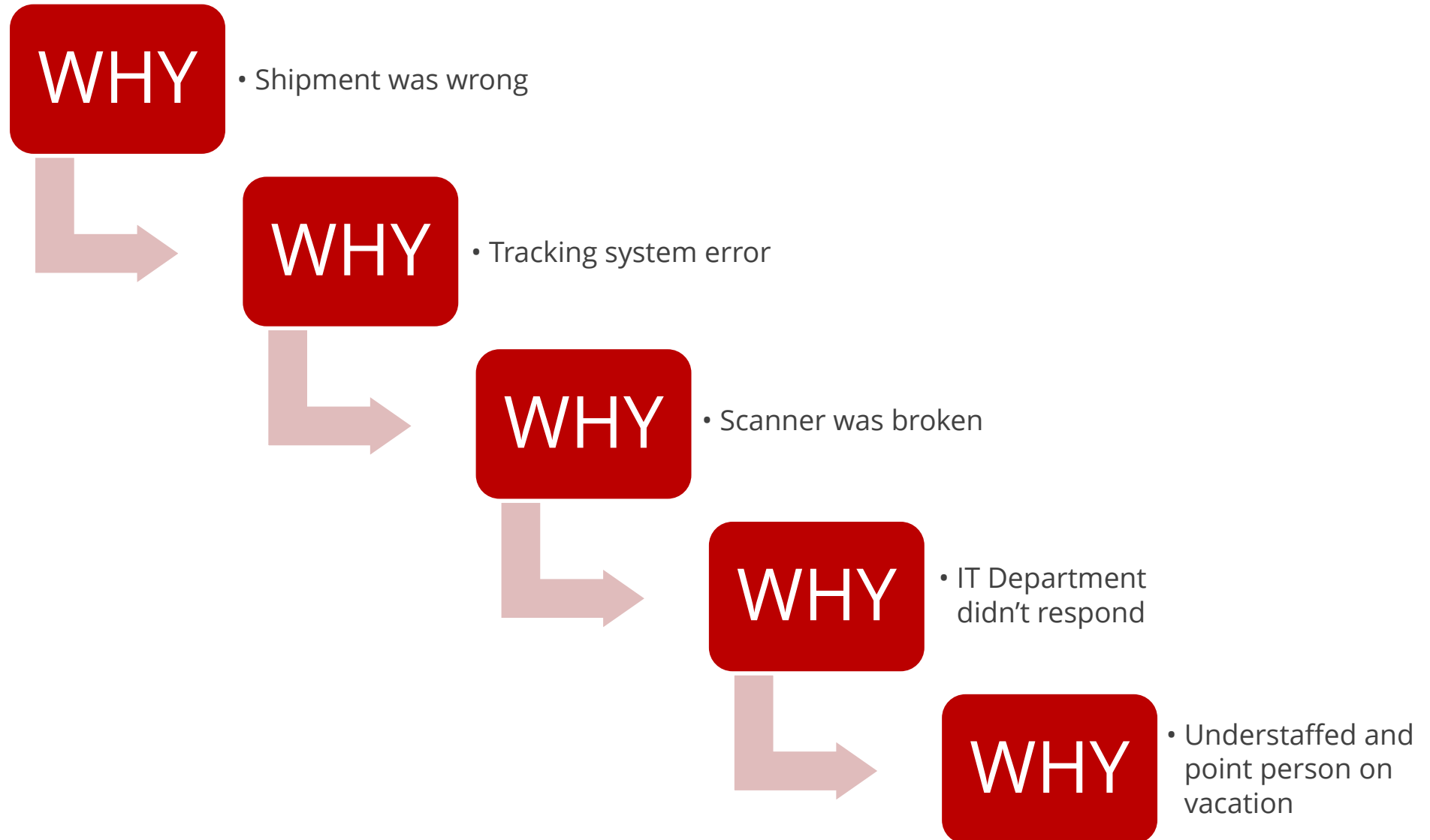
# DISCOVER – GENCHI GENBUTSU



# DISCOVER – GENCHI GENBUTSU



# DISCOVER – 5 WHYS





# DISCOVER – JOURNEY MAPPING

## Air Travel Customer Journey

Main  
Actions

At home  
researching  
and ordering  
tickets.

In the car,  
driving to the  
airport.

Ticket check-in  
at the airport.

Luggage check-in  
at the airport.

On the  
airplane.

Luggage  
pick-up at  
destination.

Emotions  
and  
Touchpoints



Thoughts

*Where do I  
want to go?  
How do I  
order?*

*I am stuck in  
traffic. What  
happens if I  
miss my flight?*

*I do not have  
time for this.  
I'm in a hurry!*

*Is my flight  
on time? Did  
I hurry for  
nothing?*

*I made it! Now  
I can relax for  
a while.*

*I hope my  
luggage is not  
missing and is  
here on time!*

Ideation

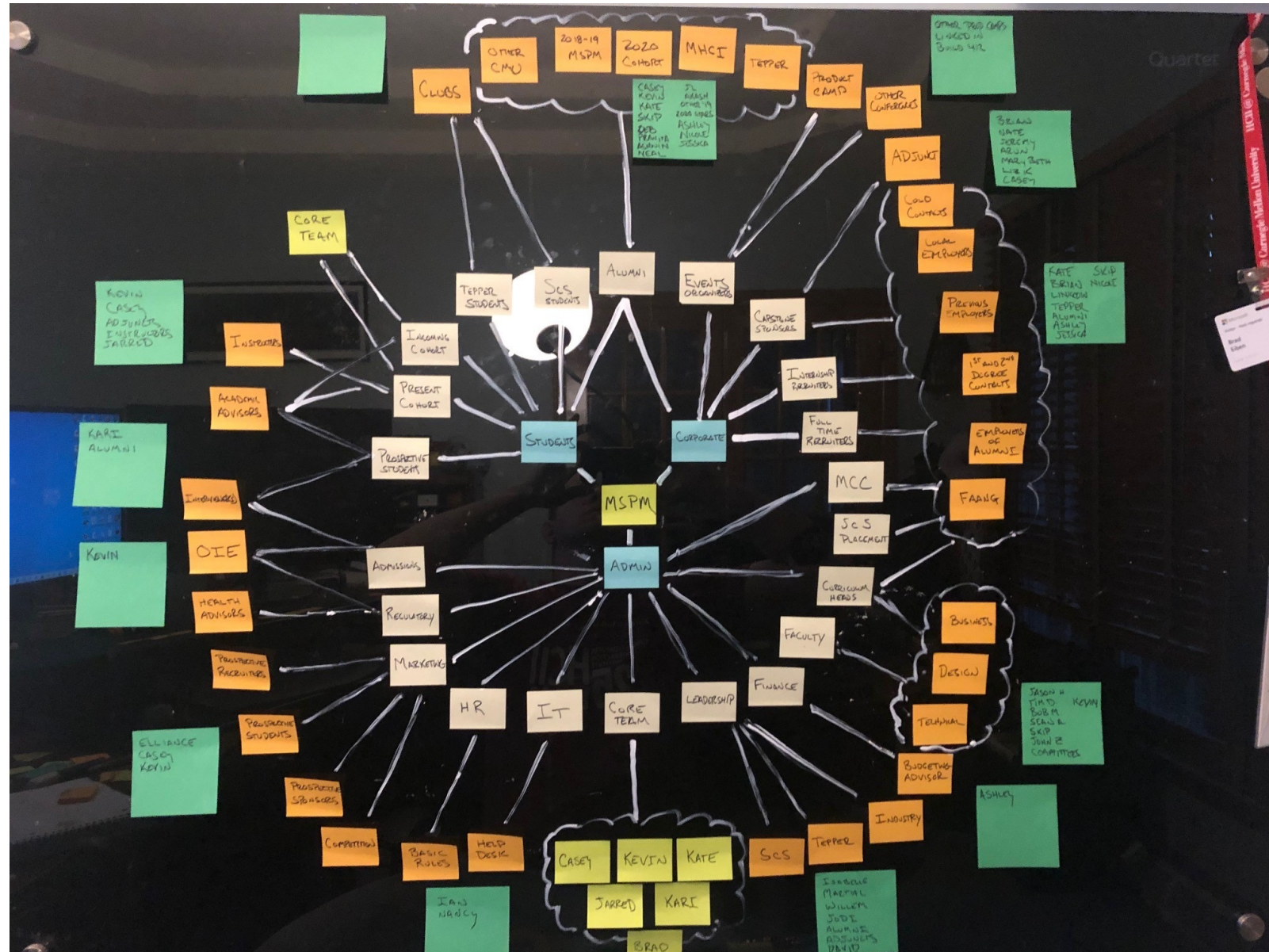
A check-in app would make it possible to check-in at home or on the way to the airport, and ease stress for our customer.

The app or another service could also notify the customer about delays and luggage status.

Source: UXPressia



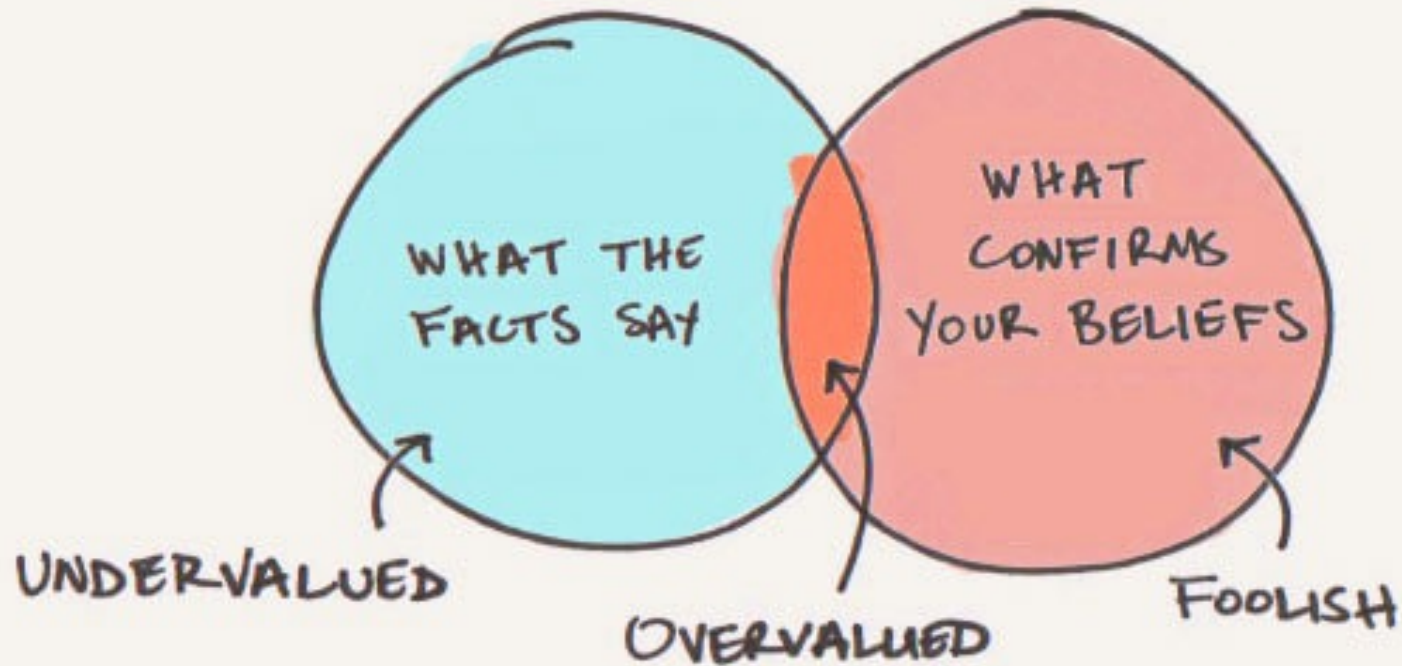
# DISCOVER – STAKEHOLDER MAPS





# INTERVIEW PITFALLS

## THE CONFIRMATION BIAS

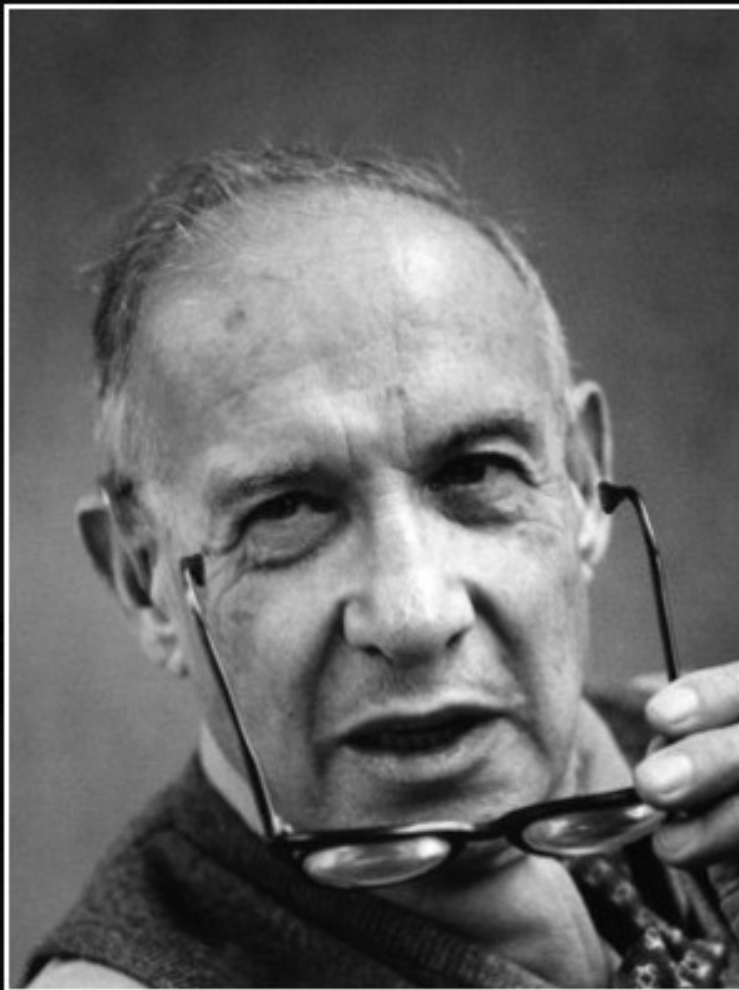


JamesClear.com





# DEFINE

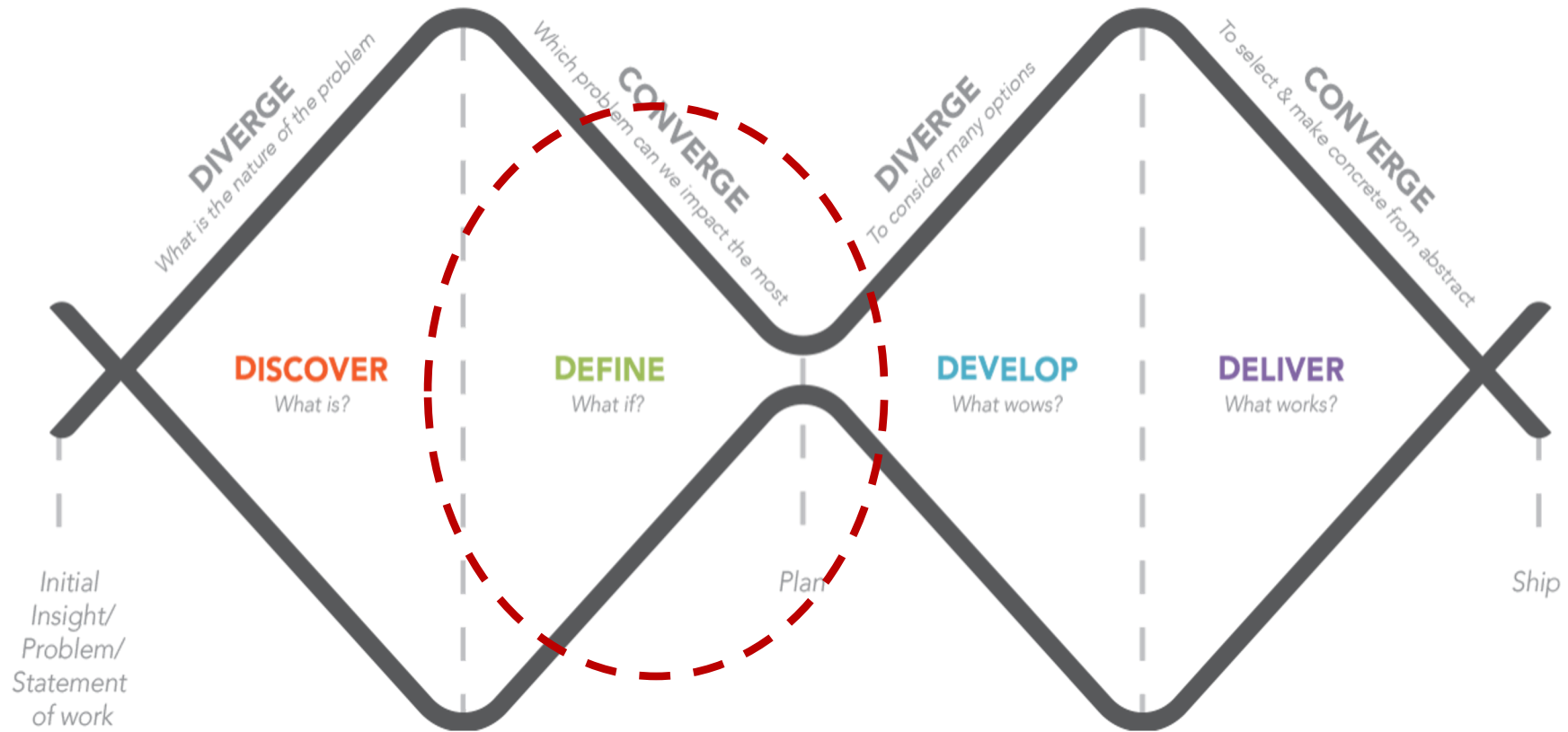


The manager who comes up with  
the right solution to the wrong  
problem is more dangerous than the  
manager who comes up with the  
wrong solution to the right problem.

— *Peter Drucker* —

AZ QUOTES

# DEFINE



Source: <https://www.nicepng.com/maxp/u2t4r5q8t4a9e6u2/>





# DEFINE

Goals: interpret, synthesize, prioritize

Mindset: analytical, collaborative

Tactics:

- Affinity Diagram
- Decision Matrix
- Personas

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MY TECH  
MBA TEPPER  
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ASKED  
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CONFUSED  
MBA v. MSPM  
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RESEARCH

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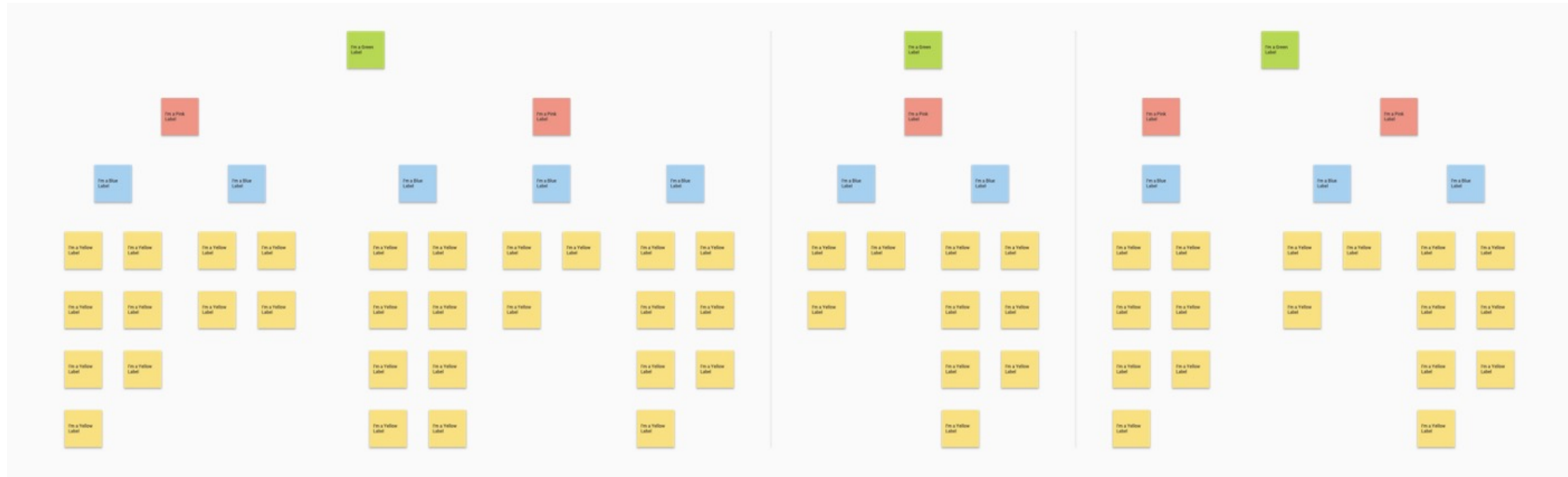
4 YR  
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# DEFINE - AFFINITY



<https://uxplanet.org/free-sketch-template-for-building-a-meaningful-affinity-diagram-during-the-ux-process-f832e081782d>



# DEFINE - PERSONA



## THE LIFER

I frequently use VA services and plan to continue doing so. I look to the VA to play a supporting, community building role in my life. I am grateful for my VA benefits, but I get frustrated when problems arise which break up the continuity of my care - like when my doctors change too frequently and when I can't transportation to VA facilities. Generally, I try to speak highly of the VA and want to contribute to making it work better for fellow Vets.



## EXPECTATIONS

- That the VA cares and takes the time to understand my needs and story
- Cost of VA services won't rise
- That I can reach someone at the VA anytime I need anything

## NEEDS

- I don't want to tell my story over and over, especially after using the VA for so long
- I want to know what's going on with my services and especially my benefits
- I'd like patient, nurturing healthcare

## DESIGNING FOR THE LIFER

Allow me to pause and ask questions, and to have access to a VA professional to speak with frequently and in a timely manner. Include info about local Veteran support chapters in communications. Provide me with a single online tool or a call center where they can refill prescriptions, see test results, and maintain all aspects of the VA needs. Give high level of feedback loops so that I can be assured my request was submitted and is being handled.

# DEFINE - PERSONA

2 // MEET VA'S USERS // PERSONAS



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## THE TRANSACTIONAL

I joined the military largely based on the promise of a the opportunities it would afford me in life. I plan to use VA services to 'get my life on track' post-service. I tend to be in the younger generation of Vets (OIF, OEF, OND). I am often engaged in the Veteran community, see other Veterans as allies and I advocate in helping folks understand and use their benefits. But I will share my frustrations if I feel like the VA isn't helping me as promised.



### EXPECTATIONS

- That the VA will deliver on its promises and help me to access the me the benefits I've earned
- That the VA has benefits available to my family
- That it'll be a headache, and I'll have to figure it out on my own with the help of my network

### NEEDS

- Accurate expectations
- Financial support at times, especially if I grow a family
- To feel like I am part of a community

### DESIGNING FOR THE TRANSACTIONAL

Explain VA benefits and services comprehensively and early so that life plans can be made upon quickly post-service. Include lists of phone numbers, websites, resources, and why they are relevant. Auto-enroll when it's possible.

Present benefits as they relate to life events (school GI Bill, employment, Job resources, family, home loan). Visualize processes, timelines and how I should be prepared.



## THE JUST-IN-CASE

I am proud of my service, but don't need the VA and plan on using it only as a backup. Mature and organized by nature, I have all of their papers in order with the VA and have a good idea of what I am eligible for.

I am grateful for the benefits available to me, but see working with the VA as a tradeoff for my time and will likely only lean on the VA as backup plan, to make sure my family is taken care of.



### EXPECTATIONS

- That I'll likely never need VA benefits
- That the VA will be there for me if I need it
- That there are benefits available to my family
- Private benefits are of higher quality & greater ease

### NEEDS

- Peace of mind
- To be assured that all documents are in line
- To easily get in touch with one person about one question

### DESIGNING FOR THE JUST-IN-CASE

Offer straightforward information about VA benefits that is easy to then communicate to others. Clearly articulate what is available, when, and to whom involved in my life.

Establish an online portal or phone system where both Veteran and the VA can see that all of paperwork is up-to-date and notify me if something is missing.



## THE INFREQUENT

I really don't think very much about the VA. I have used VA benefits in my lifetime, yet often years will go by between those interactions.

This might be because I live in a place where it's difficult to access VA services, because I am financially comfortable or because it seems like too much hassle. I tend to prefer quick interaction - a short phone call or a few clicks on a website.



### EXPECTATIONS

- The VA is slow - like any bureaucracy
- The VA is for "other, injured Vets who need it more"
- Someone will tell me when and if I am eligible for something

### NEEDS

- To be able to quickly navigate processes
- To be reminded every few years of how the VA might be able to help me

### DESIGNING FOR THE INFREQUENT

Provide ways for me to learn about and access benefits both through third parties (i.e. at the bank when securing a home loan).

I will most likely use VA services if I can a) see the value for my life and b) accomplish my goals in convenient, simple service interactions. Offer me easy-to-use websites and the ability to speak with someone.

Source: [Us Dept of Veteran Affairs](#)



# DEFINE – DECISION MATRIX

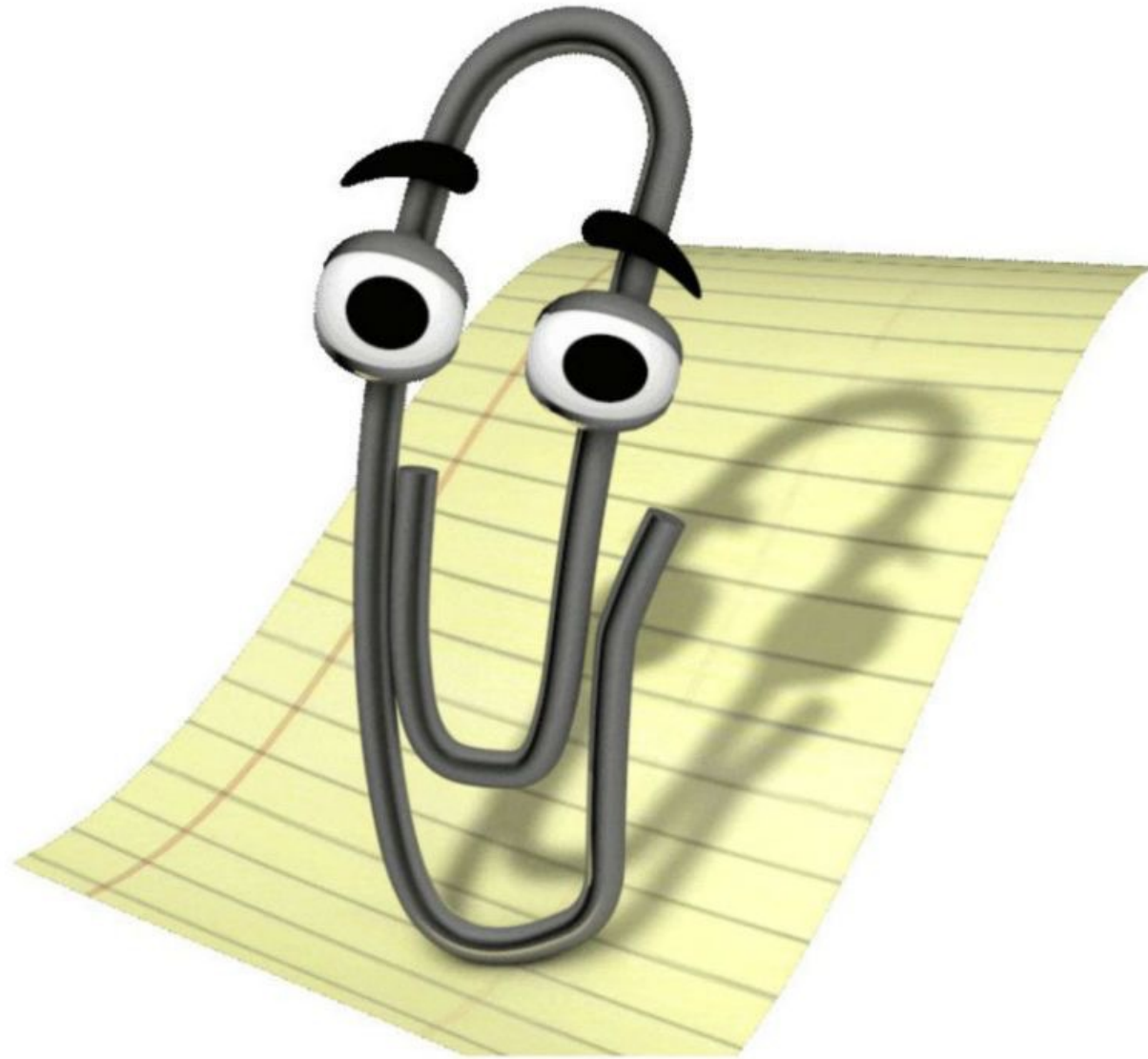
ITEM	IMPACT	FEASIBLE + RISK	COST	TIMING	OTHER	OVER ALL
Add / improve PPE. New mechanic style work gloves. Make sure enough equipment is available	5	5	5	5		20
Add safety attitude dialogue to every safety meeting. Get employees to define and find bad safety attitudes	5	5	5	5		20
Implement a safety reward program - Random raffle tickets. Monthly drawing	5	5	5	5		20
Have every employee perform a department safety inspection. Do this weekly until 1 full roster rotation is completed.	5	5	5	5		20
Enforce disciplinary action on safety violations	5	3	5	5		18
Chart department accident rates and display. Look a number of accidents VS accident rate	3	5	5	5		18
Create designated walk ways through department. 3 feet wide?	3	5	5	4		17
Ergonomic assement of the Tool room	3	5	3	5		16
Improve shop work space. Limit number of pallets in the department. Designated storage areas. Overflow area?	3	3	5	5		16
Exercise program - Strecthing	2	1	5	5		13
Change dress code to no shorts or sleeveless shirts.	2	1	5	3		11
Setup proficiency tests for Toolmakers. Levels?	4	1	2	1		8
Add new brighter lighting to department	3	1	1	1		6
Mold storage racks for long term mold/job storage. *Requires additional forklift added to department	2	1	1	1		5



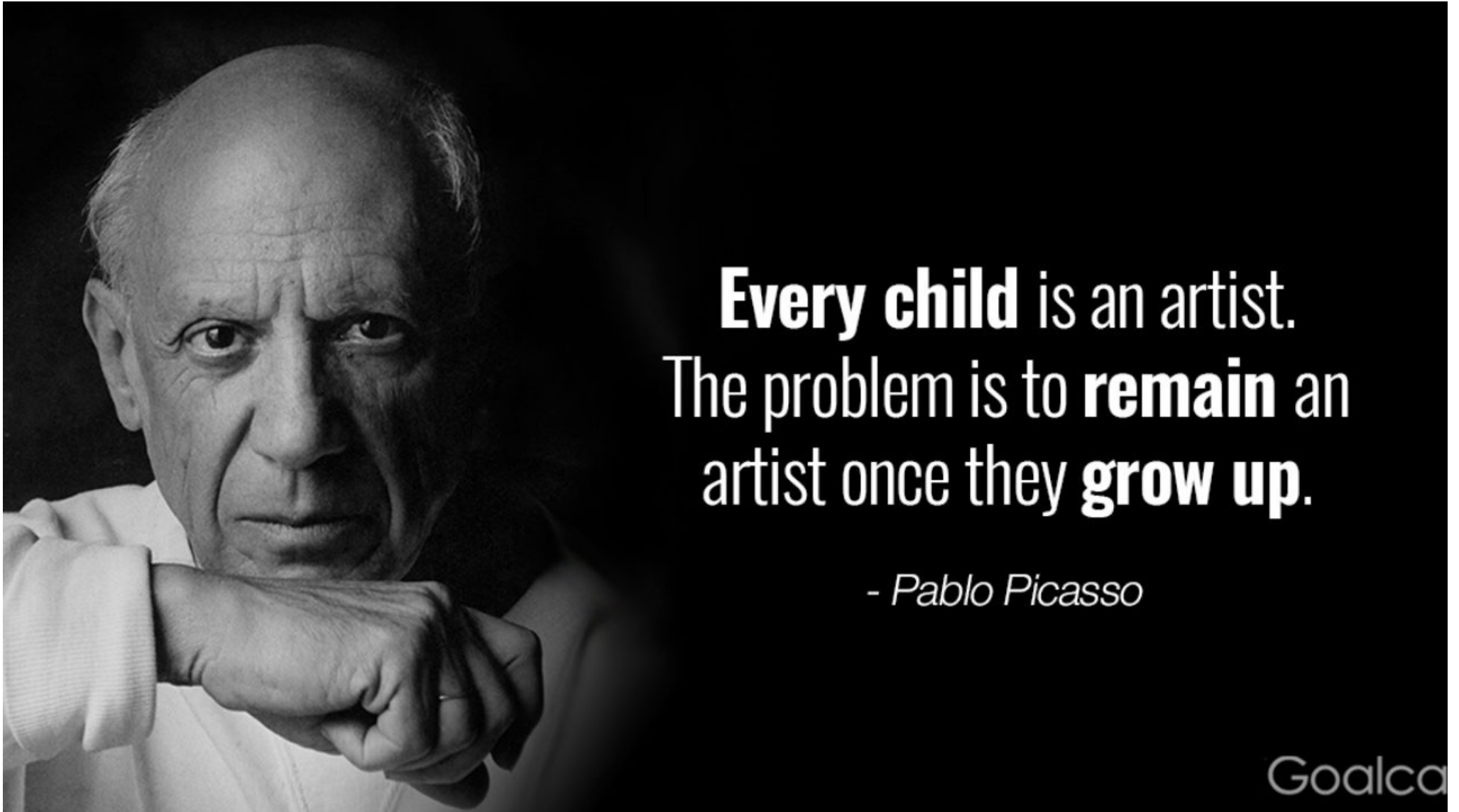


# ACTIVITY #2

## DIVERGENT THINKING











# DESIGN (DEVELOP)

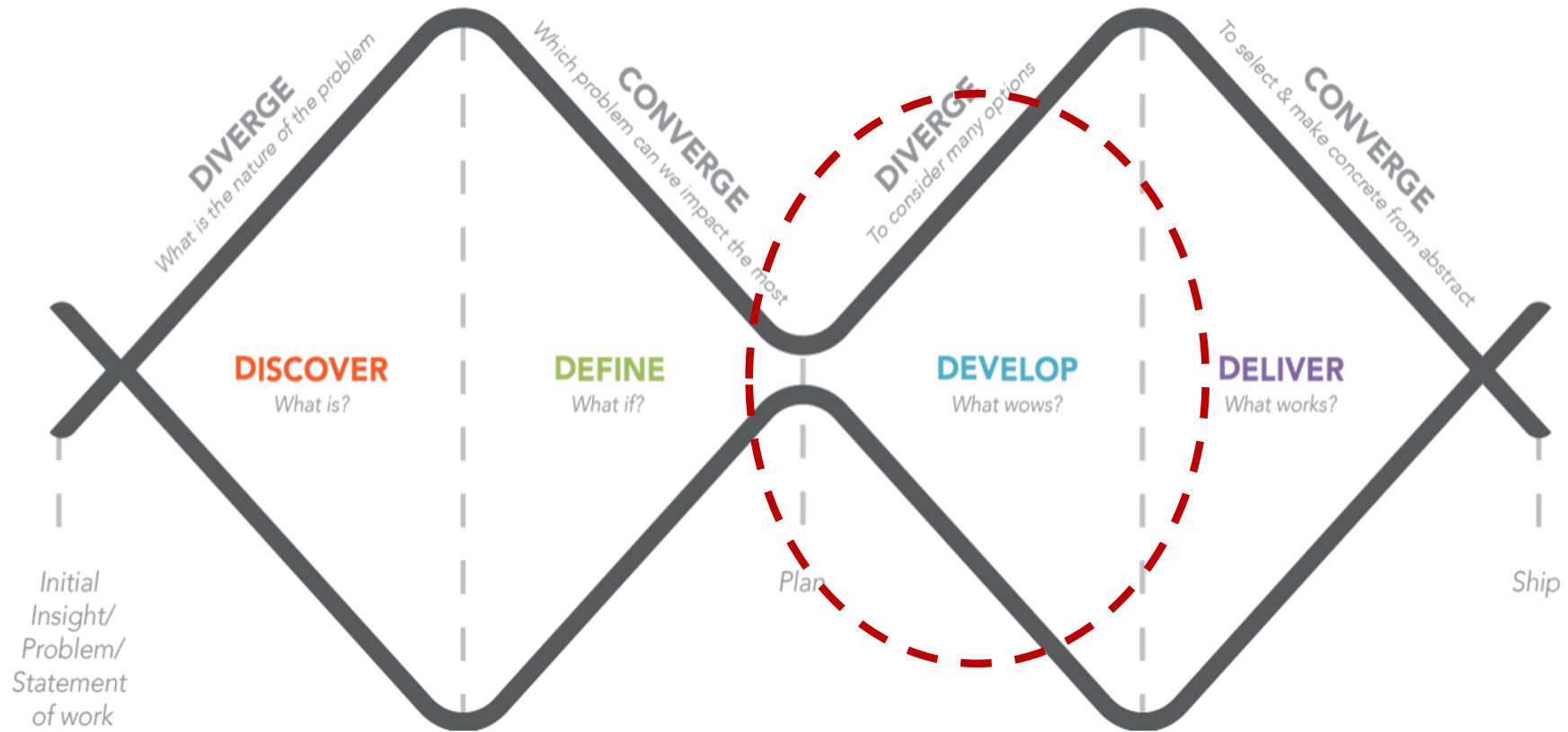


The best way to have a good idea is  
to have a lot of ideas.

— *Linus Pauling* —

AZ QUOTES

# DEFINE



Source: <https://www.nicepng.com/maxp/u2t4r5q8t4a9e6u2/>





# DESIGN

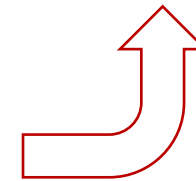
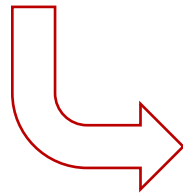
Goals: ideate, experiment, prototype

Mindset: exploratory, egoless, hands-on

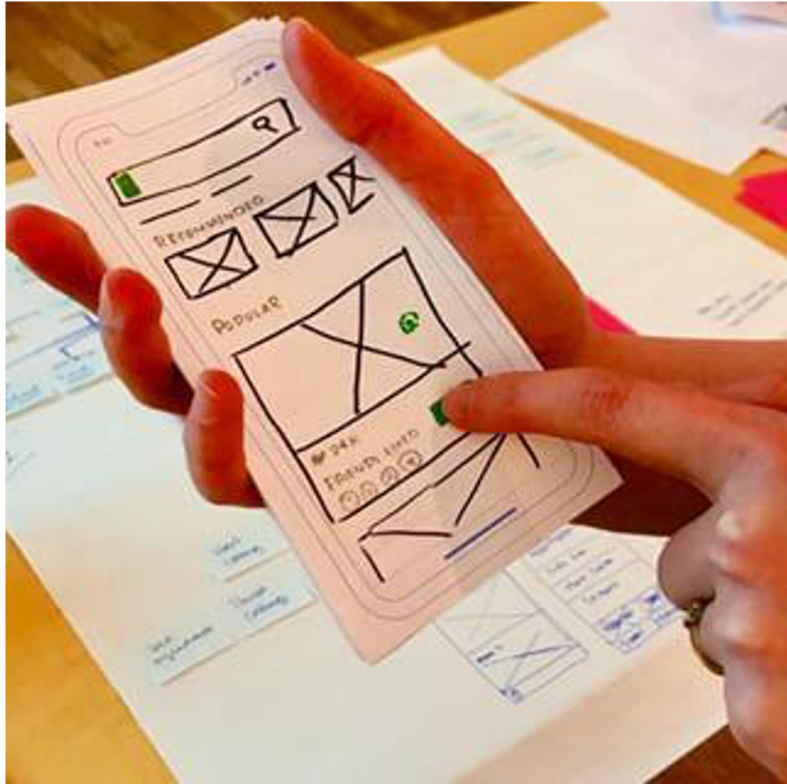
Tactics:

- Prototyping
- Sketching
- “How Might We”

# DESIGN - PROTOTYPING







[Source: Johny Vinoux](#)





# PalmPilot wooden model

Jeff Hawkins, 1995

*"Tested design with this model using a chopstick for a stylus."*

*He took pretend notes in meetings and counted the steps it took to perform common tasks."*



[Source: Computer History Museum](#)

# DESIGN - SKETCHING



Source: <https://www.walmart.com/ip/LEGO-Marvel-Avengers-Tony-Stark-Minifigure-Black-Iron-Man-Suit-No-Packaging/205572104>



# DESIGN – HOW MIGHT WE



[https://www.youtube.com/watch?v=ry55--J4\\_VQ](https://www.youtube.com/watch?v=ry55--J4_VQ)





# DELIVER

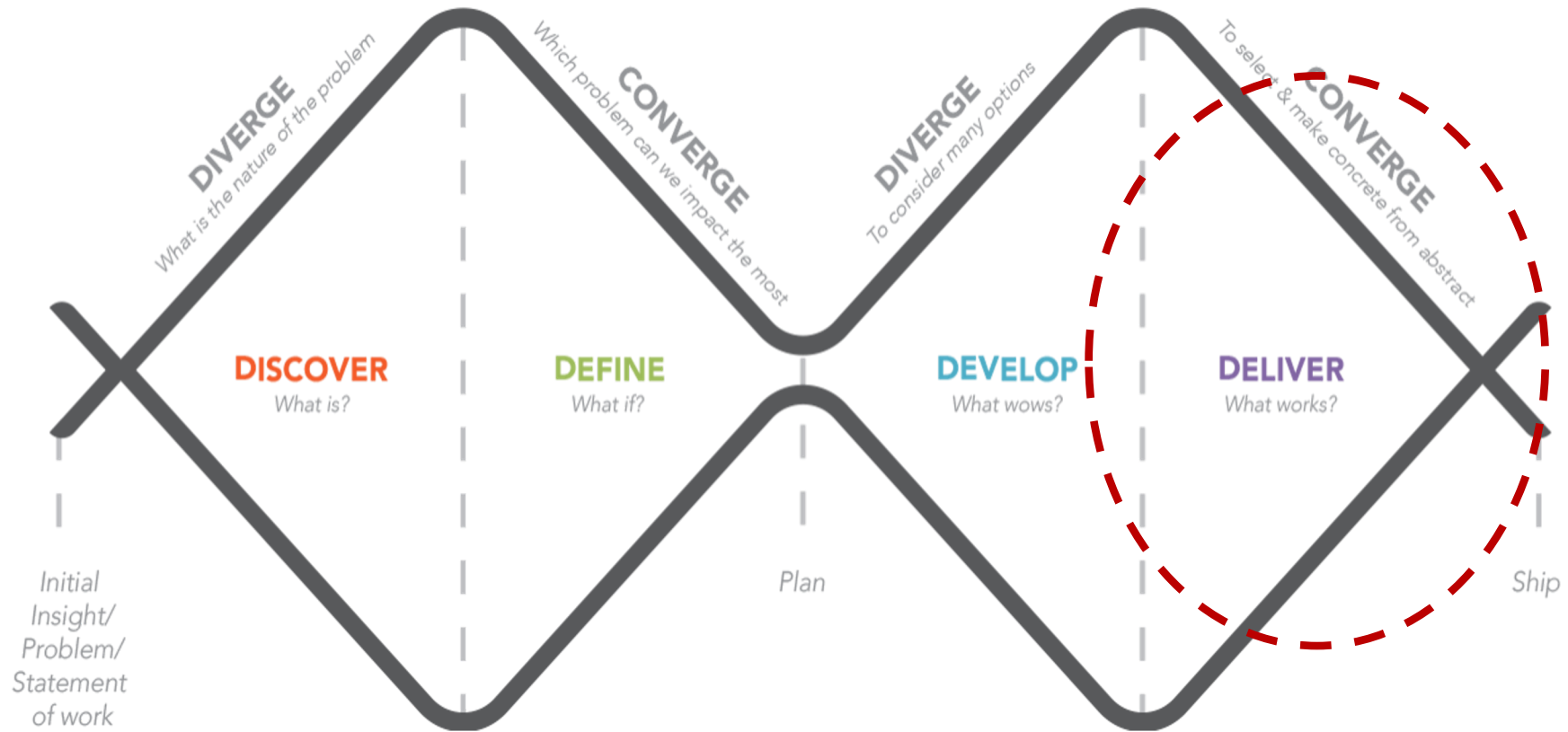


Design is not just what it looks like  
and feels like. Design is how it works.

— *Steve Jobs* —

AZ QUOTES

# DEFINE



Source: <https://www.nicepng.com/maxp/u2t4r5q8t4a9e6u2/>





# DELIVER

Goals: test, debug, launch

Mindset: critical, entrepreneurial, strategic

Tactics:

- Think Aloud Testing
- Heuristic Evaluation
- Iteration













# DESIGN – THINK ALOUD

- Similar to interviews in discover phase
- Performed on your prototype
- Encourage the tester to speak as they perform tasks

# DESIGN – HEURISTIC EVALUATION

## 10 Usability Heuristics

-  Visibility of system status
-  Match between system and the real world
-  User control and freedom
-  Consistency and standards
-  Error prevention
-  Recognition rather than recall
-  Flexibility and efficiency of use
-  Aesthetic and minimalist design
-  Helps users recognise, diagnose, and recover from errors
-  Help and documentation

[Source: Interaction design foundation](#)





<https://www.nbcbayarea.com/news/local/New-Traffic-Lights-in-Santa-Clara-Leave-Drivers-Baffled-430054623.html>



## CROSSWALK CONFUSION SANTA CLARA

NBCBAYAREA.COM

NBC  
BAY AREA





Never give an order that can't be  
obeyed.

— Douglas MacArthur —

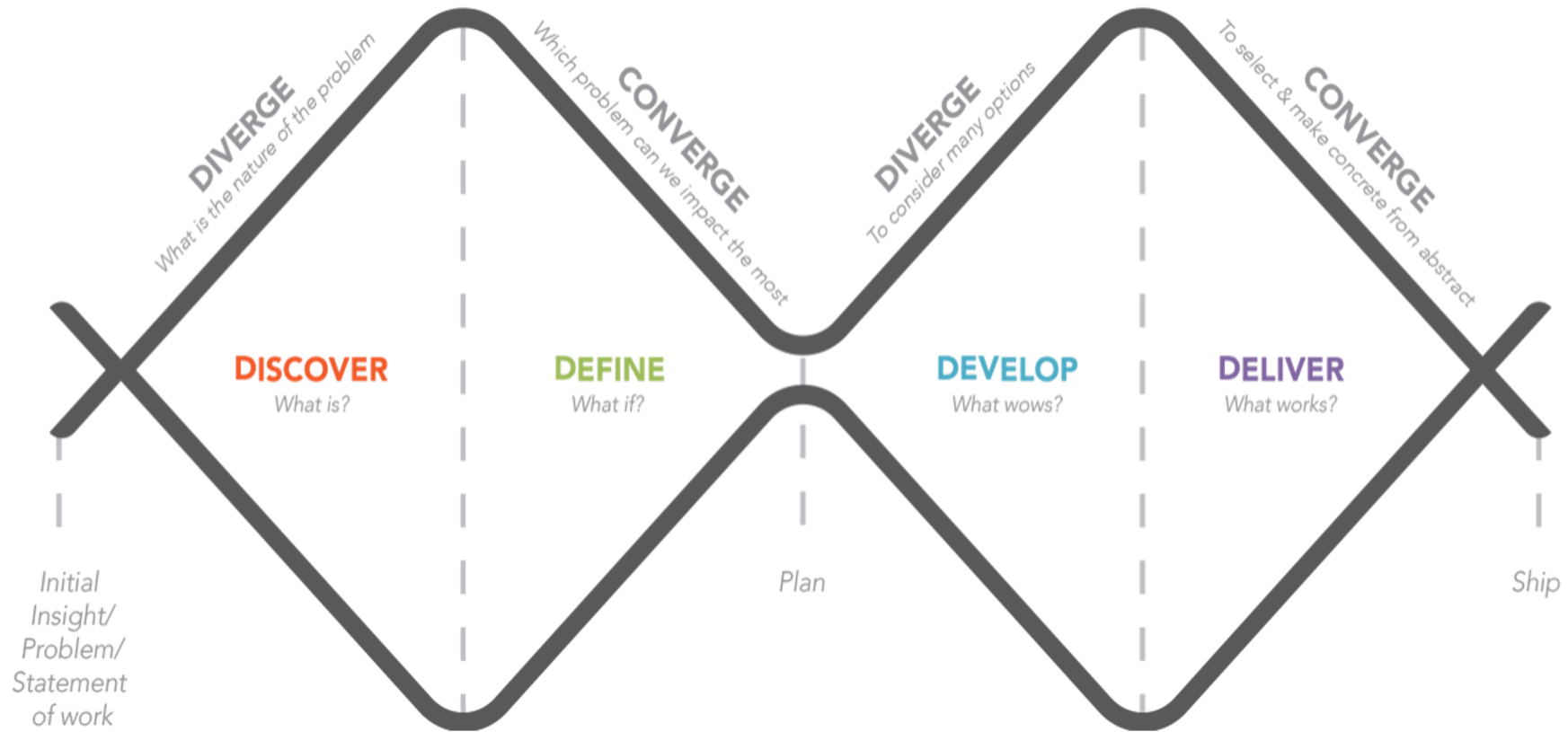
AZ QUOTES







# DESIGN – ITERATE



Source: <https://www.nicepng.com/maxp/u2t4r5q8t4a9e6u2/>



# ACTIVITY #3 THINK ALOUD





Find a partner

Conduct a 5 minute think aloud

Goal is to practice encouraging the interviewee to keep talking as they complete the task

What are the nearest 15 restaurants?



# Thank You...

Many ideas and much of the content in this presentation are borrowed from the faculty of CMU's Human-Computer Interaction Institute. It is derived from the course *HCI for Tech Execs* and has been developed by Brad Myers then adapted by Laura Dabbish and Raelin Musuraca among others.

For those who find this topic interesting, *HCI for Tech Execs* would be an excellent course.